A.H.U.
MANUAL

Version 20-25 HP

TECNOCASA
CLIMATIZZAZIONE

20 HP - 25 HP Direct Expansion Air Treatment Unit

Contents:

1. Characteristics…… 3

2. Kit components…… 3

3. How to select the heating battery…… 3

4. Functional diagram…… 4

5. Electrical connections…… 5

6. Dimensions of kit components …… 7

7. Refrigerator circuit diagram and position of temperature sensors…… 9

8.0 Electrical Diagram – Page 1 of 3…… 10
8.1 Electrical Diagram – Page 2 of 3…… 11
8.2 Electrical Diagram – Page 3 of 3…… 12

9. Example of ATU control system wiring…… 13

10. Switch setting…… 14

11. Optional extras…… 17

12. Frequently asked questions…… 18

13. Applications…… 19

1. Characteristics

Rated Cooling Power: 71KW
Rated Heating Power: 80KW
Maximum Heating Power: 84KW
On-Off Fan Control

2. Kit Components

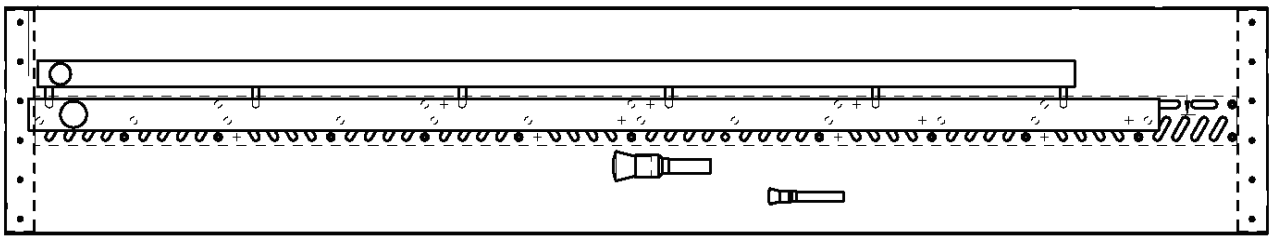
The kit comprises the following:

- Control board: consists of the boards for controlling the expansion valves and the fan (the gradual start up system for the fan is available on request)
- 3 Electronic Expansion Valves
- 6 Filters for protecting the valves
- Copper branching set to connect the refrigerator circuit components

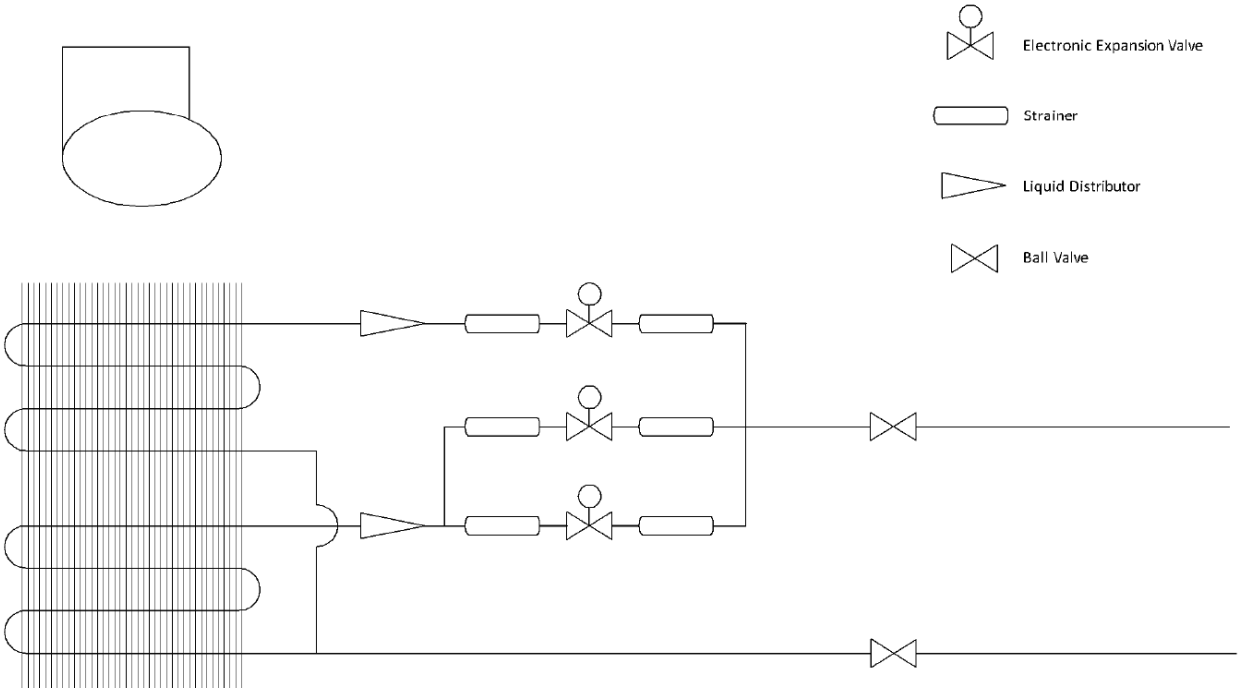
3. How to select the heating battery

20 HP Permitted Volume from 9 dm^3 to 11 dm^3
25 HP Permitted Volume from 10 dm^3 to 13 dm^3
Cooling Mode
- Equivalent Evaporation Temperature 7°C
- Overheating Temperature 5°C
Heating Mode
- Equivalent Condensation Temperature 45°C
- Subcooling Temperature 5°C

The heating battery is divided into two parts. The first part is designed for 2/3 of the total capacity and the second for the remainder. The air passes firstly through the larger battery and then through the smaller one (see drawing below)



4. Functional Diagram



Cooling Mode

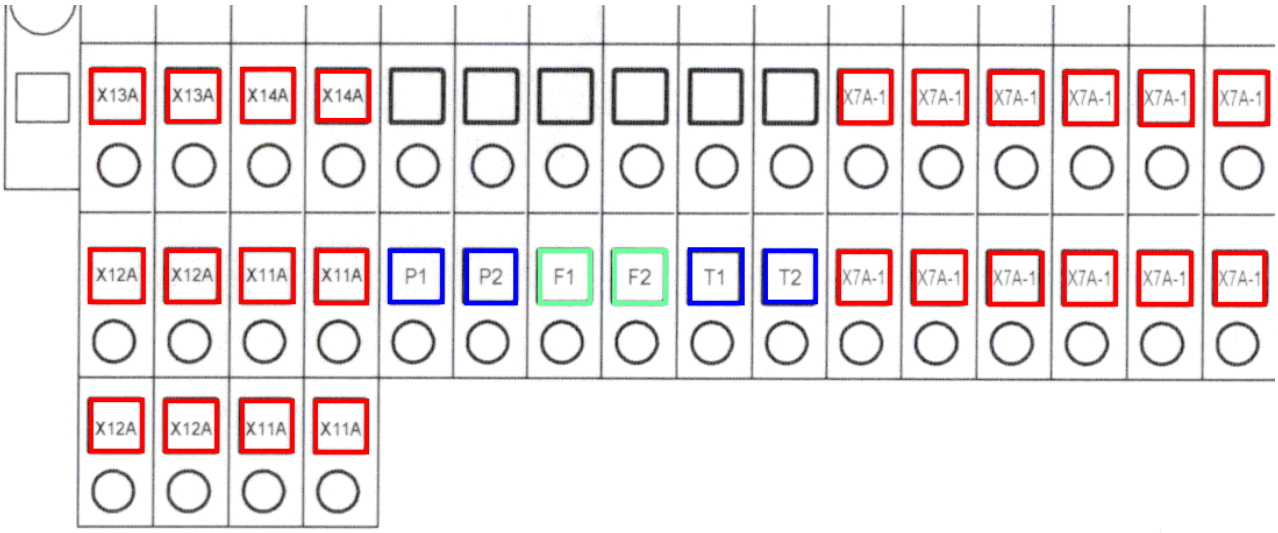
The refrigerant gas in liquid state arrives at the three-way joint and divides itself into two: 1/3 flows through the filters and an expansion valve to reach the small distributor; the other 2/3 flows through the other two expansion valves and the small branch to reach the large distributor. After the cooling battery, the refrigerant passes through the large branch and continues on to the GHP.

Heating Mode

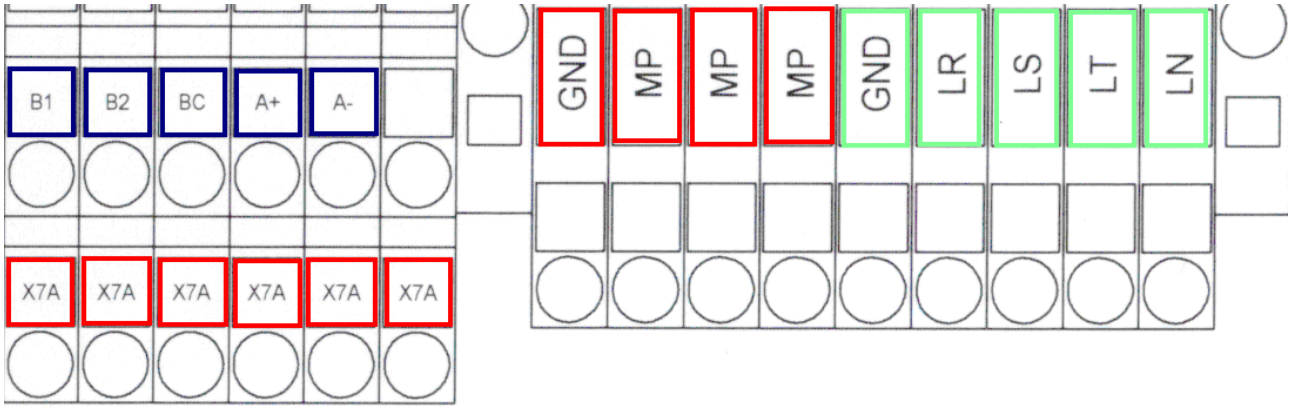
The refrigerant gas flows through the large branch and continues on to the heating battery. In liquid state it passes through the distributors, the expansion valves and the three-way joint and continues on to the GHP.

5. Electrical Connections

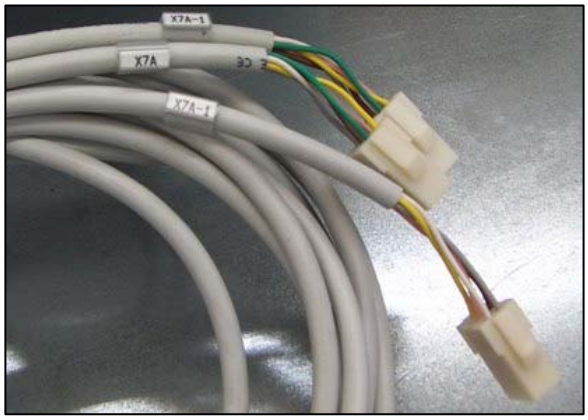
The terminals in the terminal block below are divided into different colours with the following meanings:
Those marked in red are the electrical connections carried out during construction of the ATU.
Those in blue show optional contacts.
Those in green refer to contacts carried out during installation of the ATU
Connection of the expansion valves is carried out using special anchors included in the kit so as to avoid incorrect electrical connections.



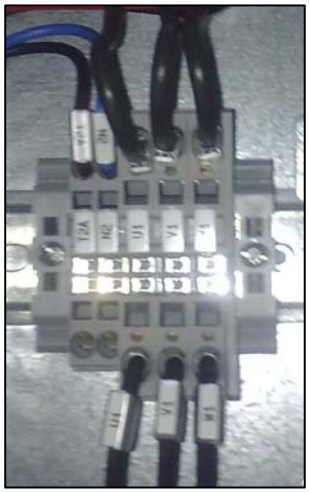
X13A : Air Intake Temperature Sensor
X12A : Second Row Terminals: Liquid Pipe Temperature Sensor (Heating Battery Large Section)
X12A : Third Row Terminals –: Liquid Pipe Temperature Sensor (Heating Battery Small Section)
X14A : Discharge Temperature Sensor
X11A : Second Row Terminals: Gas Pipe Temperature Sensor (Heating Battery Large Section)
X11A : Third Row Terminals: Gas Pipe Temperature Sensor (Heating Battery Small Section)
P1-P2 : Optional Second Remote Control
F1-F2 : Communication Bus line (to GHP)
T1-T2 : On/Off or Forced Off contact
X7A-1 : Expansion Valves Control (Heating Battery Large Section)



X7A : Expansion Valve Control (Heating Battery Small Section)
B1B2BC : Digital Input
A+A- : Temperature Adjustment Analogue Input
GND-MP-MP-MP: Motor Fan Supply
GND-LR-LS-LT-LN: ATU Supply



These are the X7A connectors (already wired in the electric box)



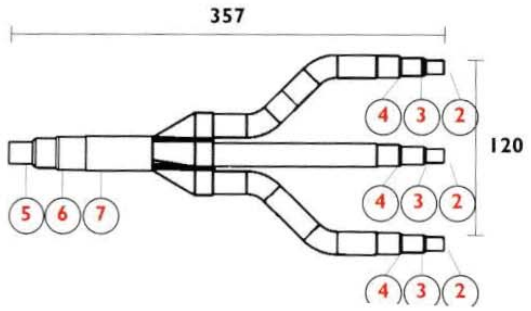
T2A-N2 : Supply device for gradual start up of fan

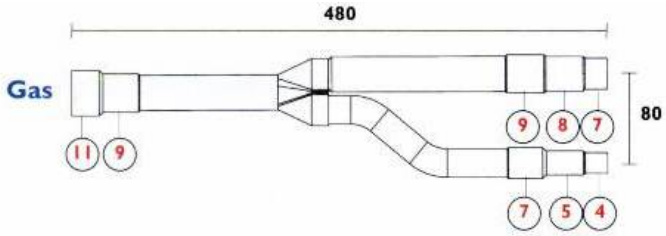
The electric box may be equipped with a device for the gradual start up of the fan so as to avoid sharp increases in air pressure in the channelling.

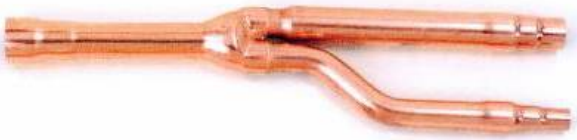
6. Dimensions of Kit Components

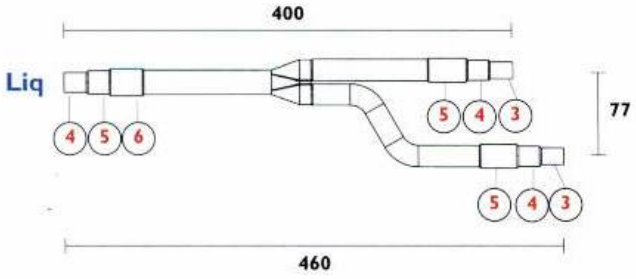
Component dimensions in the Kit linked to the ATU

Copper Branches









Electric panel

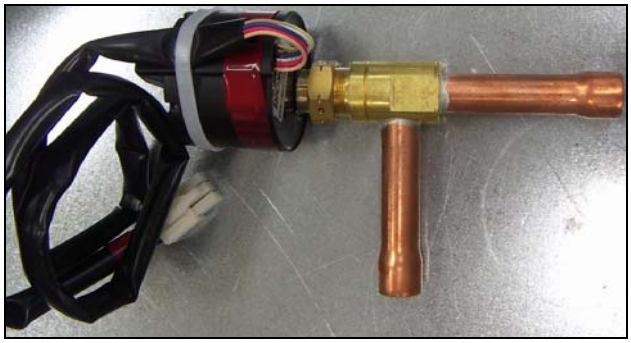
Electric panel dimensions: 65cm x 42cm x 20 cm (the door is not shown in the picture below)

Filters

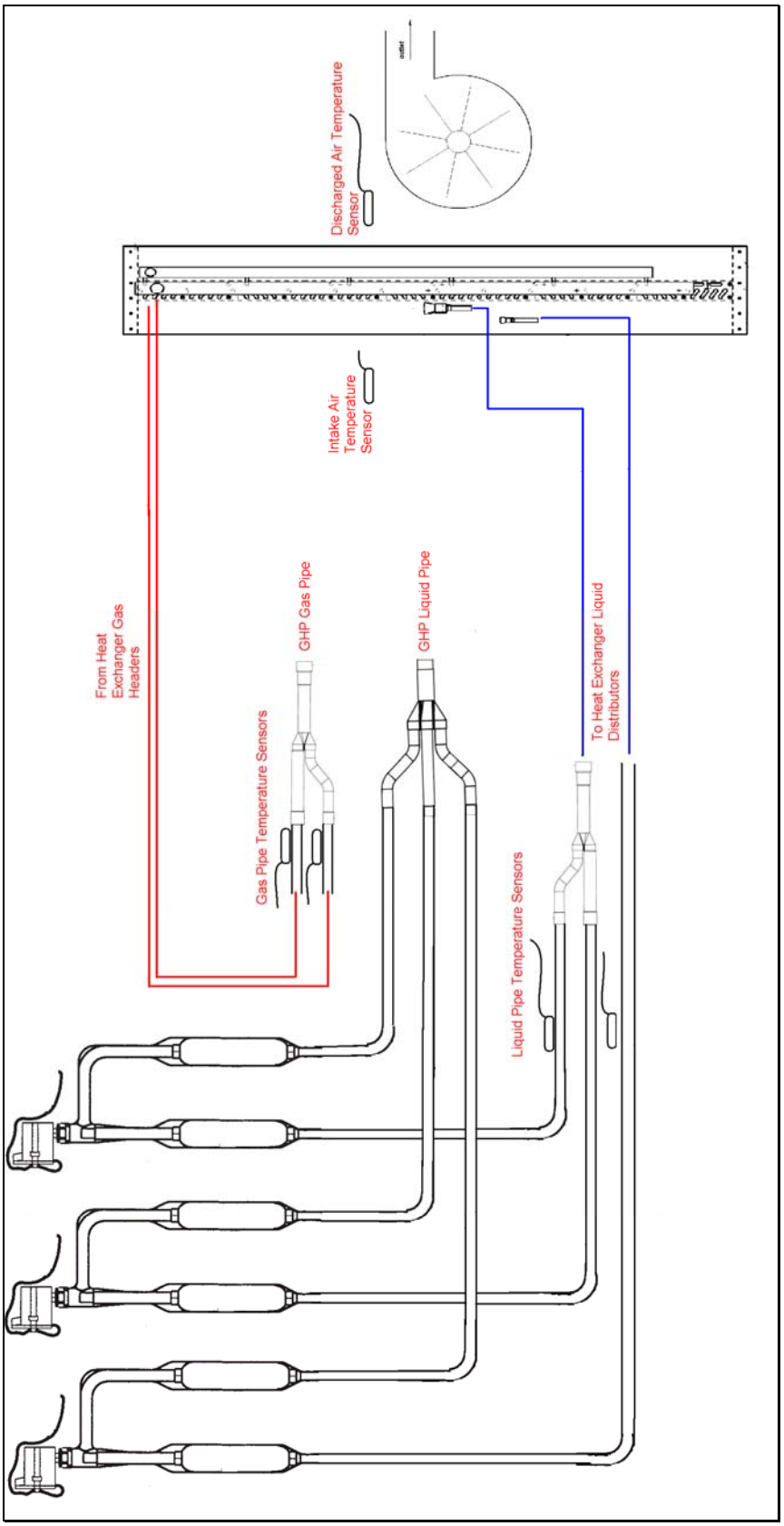
Each filter is 13 cm long

Expansion valves

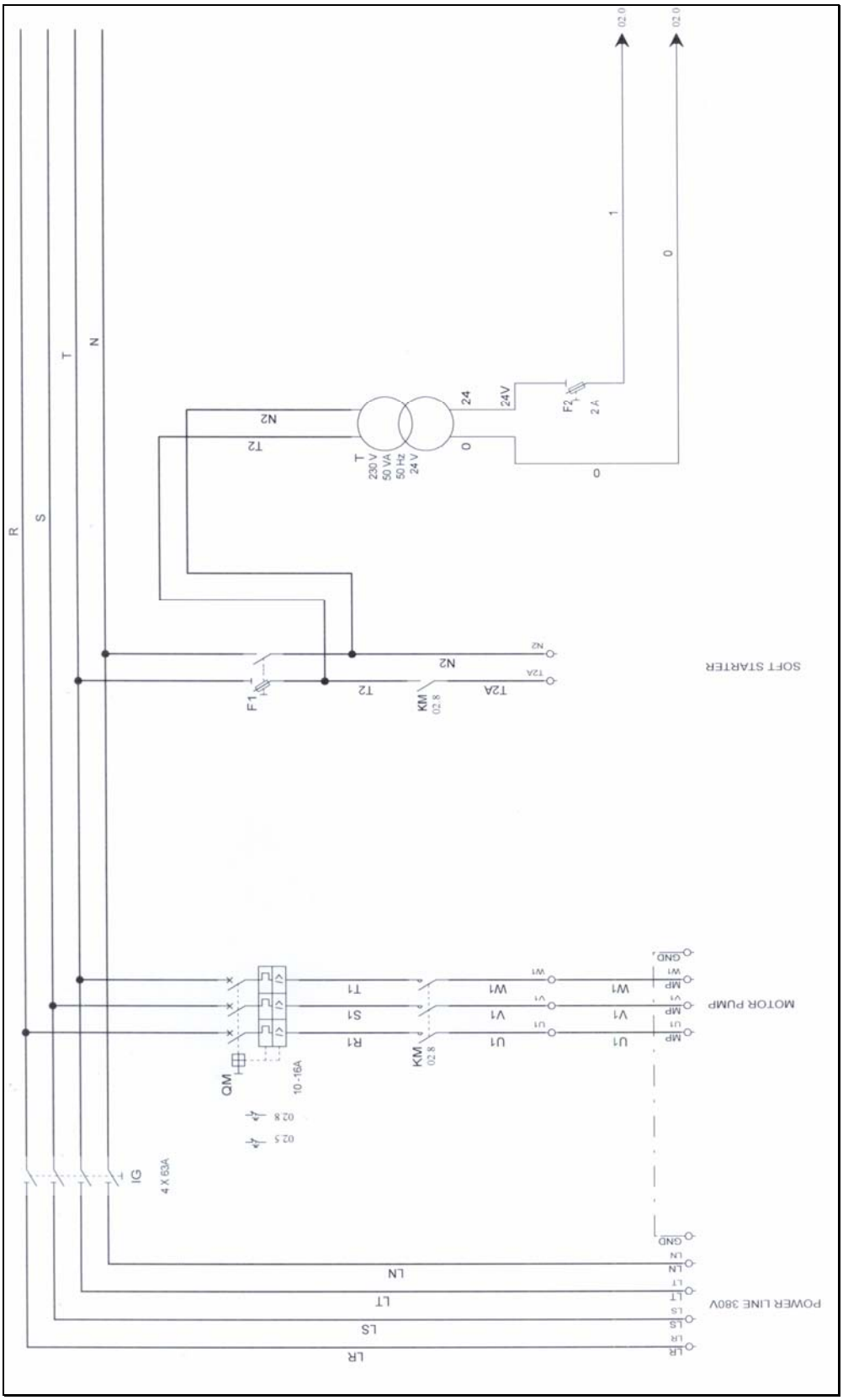
Each expansion valve is supplied with two 5cm-long copper pipes



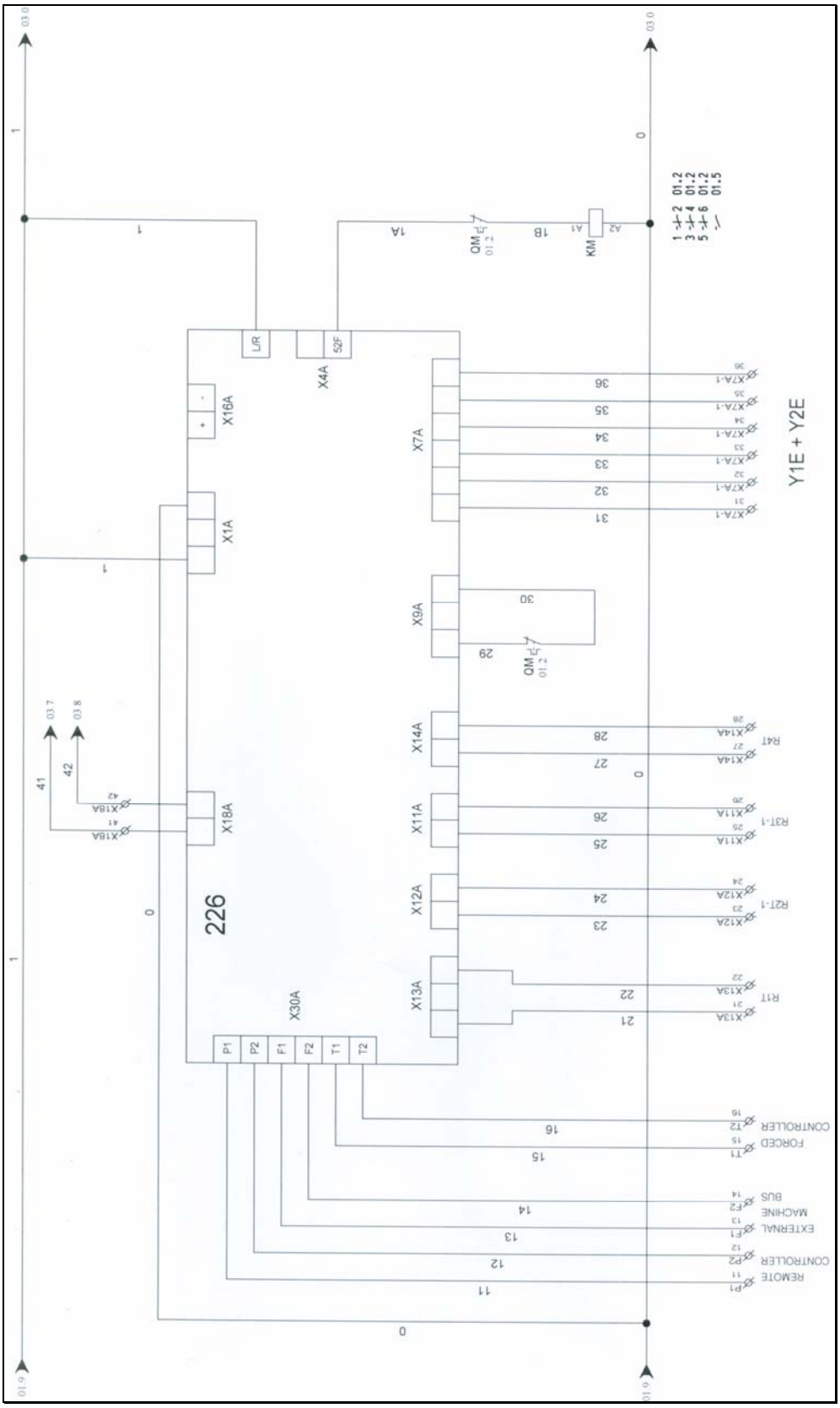
7. Refrigerant Gas Circuit and Position of Temperature Sensors


Discharged Air Temperature Sensor
Intake Air Temperature Sensor
From Heat Exchanger Gas Headers
GHP Gas Pipe
GHP Liquid Pipe
To Heat Exchanger Liquid Distributors
Gas Pipe Temperature Sensors
Liquid Pipe Temperature Sensors

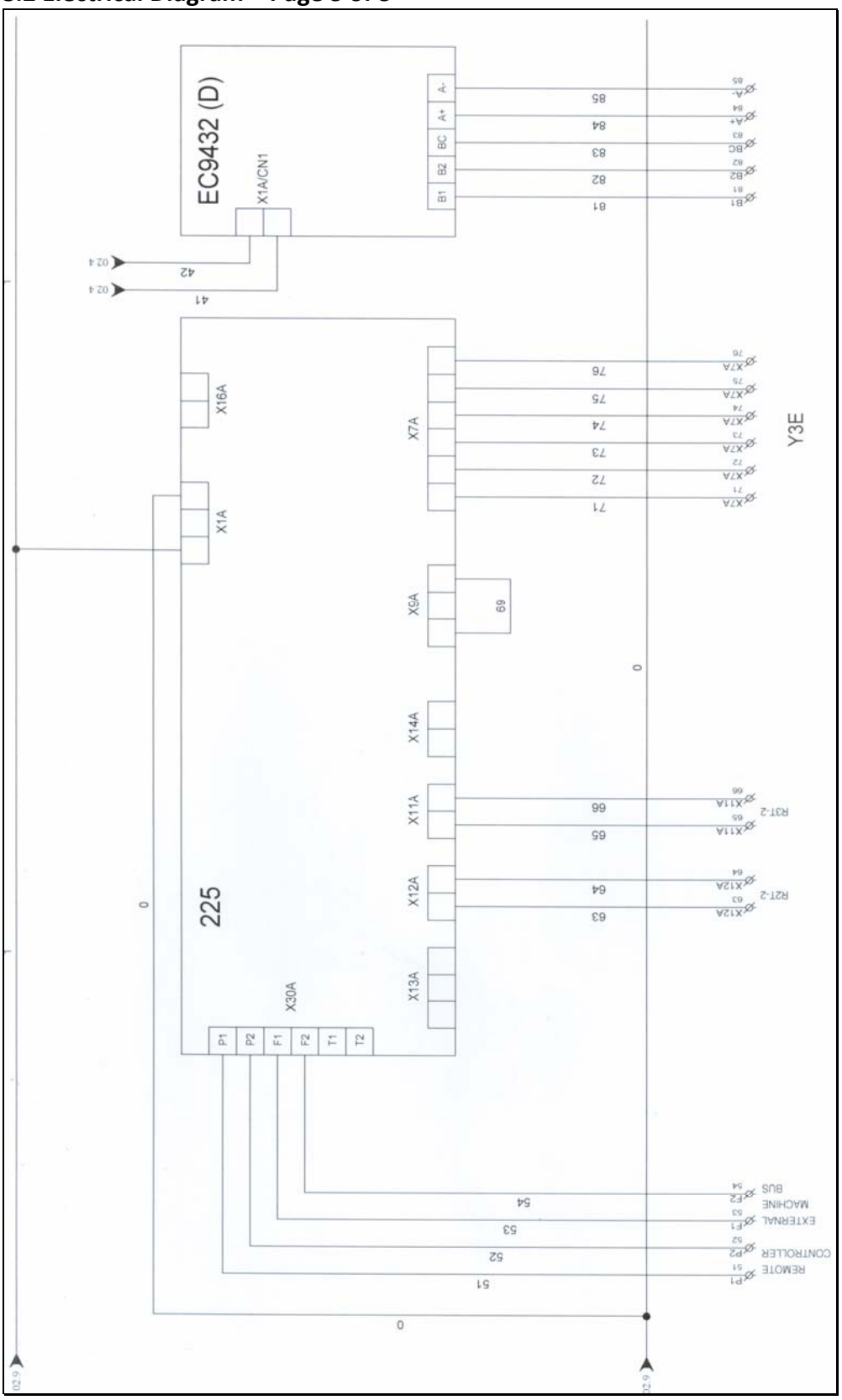
8.0 Electrical Diagram – Page 1 of 3



8.1 Electrical Diagram – Page 2 of 3



8.2 Electrical Diagram – Page 3 of 3



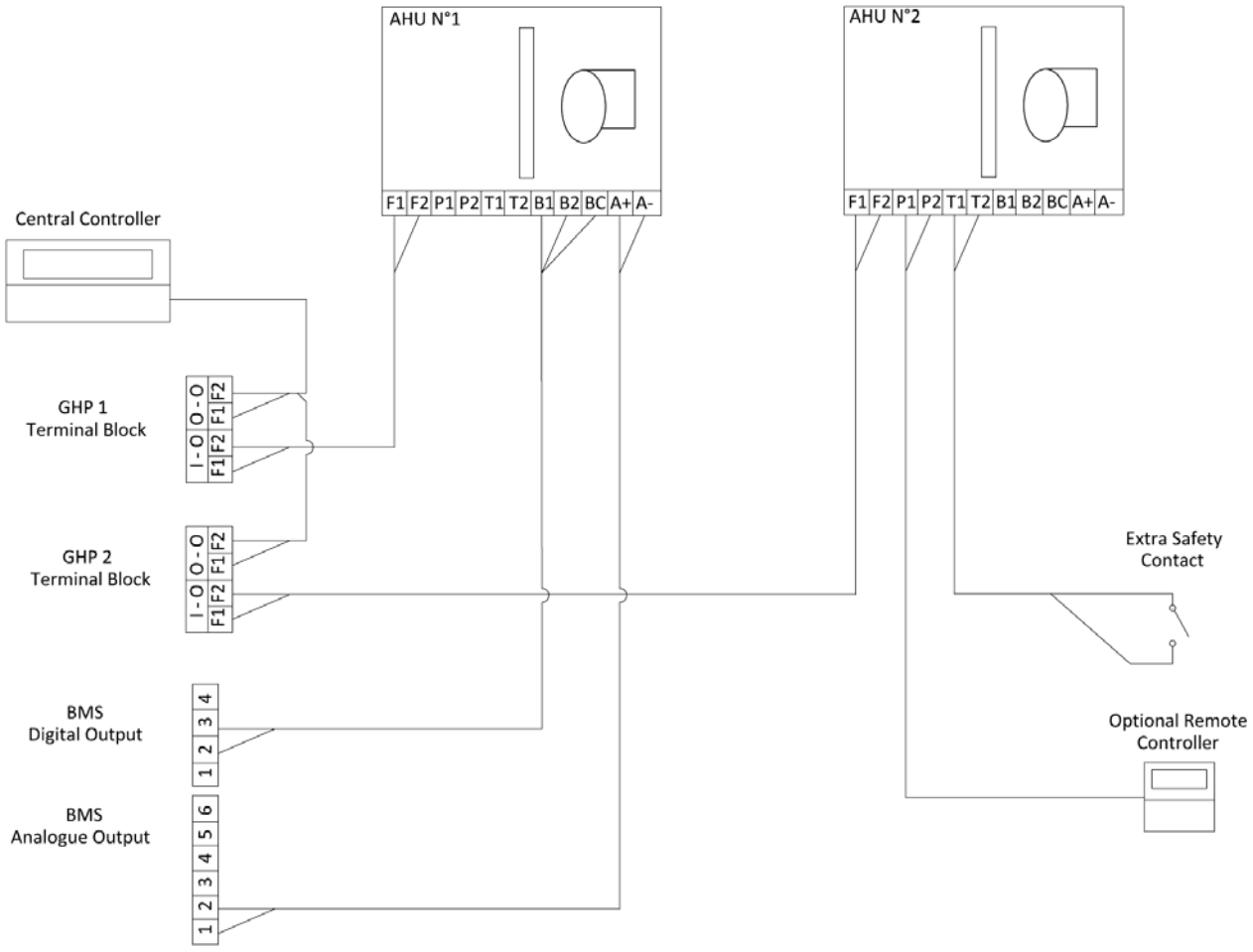
9. Example of ATU Control System Wiring

The ATU may be controlled by the following:

- Standard wired control or centralized control according to the attached AISIN and DAIKIN user manual. If a second remote control is installed, it should be set in “slave” mode.

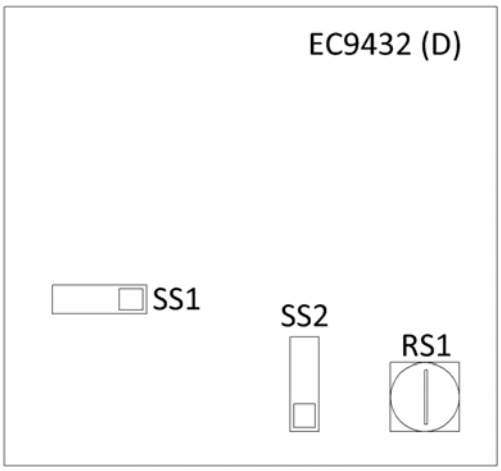
- Analogue and BMS Digital input according to the description in the chapter “Switch setting”

- Forced OFF digital input (T1T2)



10. Switch setting

The board EC9432 (D) is installed in the top of the electric panel, under the AISIN remote control. Remove the board from the DIN bar before carrying out any operation.



Predefined setting:

SS1 – WITHOUT POWER
SS2 – POSSIBLE
RS1 – POSITION 0

A+A- Temperature adjustment

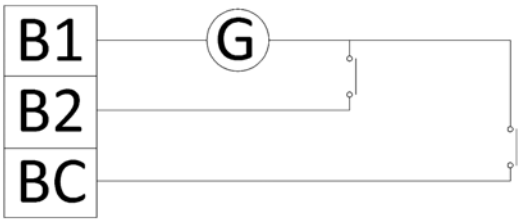
To enable adjustment of the temperature from the remote control and from the A+A contact, set Switch SS2 to “POSSIBLE”. By setting “IMPOSSIBLE” you exclude the possibility of adjusting the temperature with the remote control. It is forbidden to power the terminal block A+A.

The following table shows the values of the resistances corresponding to the various temperatures

Set Temp	16	17	18	19	20	21	22	23	24
Ohm	0 ÷ 3.4	5 ÷ 11.6	13.8 ÷ 20.0	22.4 ÷ 28.4	31.0 ÷ 36.4	39.4 ÷ 44.8	48.2 ÷ 52.8	56.6 ÷ 61.2	65.2 ÷ 69.4
Set Temp	25	26	27	28	29	30	31	32	
Ohm	73.8 ÷ 77.8	82.4 ÷ 85.8	91.0 ÷ 94.0	99.4 ÷ 102.2	108.6 ÷ 110.4	117.2 ÷ 119.2	125.8 ÷ 127.4	134.2 ÷ 140.0	

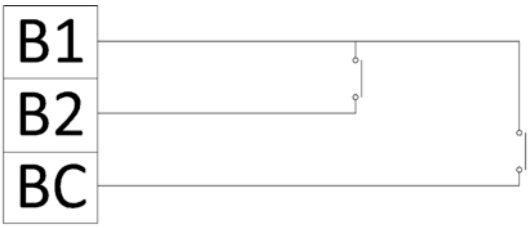
B1B2Bc Input

Input with voltage



Set Switch SS1 at “VOLT” and give 12-24 V direct current. Without polarity

Input without voltage



Set Switch SS1 at “NON VOLT” and use a vinyl sheath of 0.18 mm² or more. The total length must not exceed 150 m

Setting the RS1 Rotary Switch Control Mode

Description of functions:

Remote Control rejection: switching on/off is carried out only from the central control

Only OFF accepted by Remote Control: the remote control can only switch off

Central priority: you can switch on only from the centralized control and the remote control can only set the time

Individual priority: you can switch on/off from both the centralized control and the remote control

Remote Control authorization from Timer: you can switch on/off from the remote control during setting of the time

RS1 Position	Functions	Description of Operations	
		Input between B1 - Bc	Input between B2 – Bc
0	Input ignored	-	-
1	Remote Control rejection	Start at ON, Stop at Off	Stop at ON (remote control rejection), input B1 – Bc acceptance at OFF
2	Central Priority	Start at ON (remote control acceptance) Stop at OFF (remote control rejection)	
3	Remote Control Acceptance/Rejection	As in position 1 (only stop is accepted by the remote control)	
4	Remote Control Acceptance/Rejection, OFF	Start at ON (acceptance) Stop at OFF (remote control rejection)	
5	Remote Control Rejection	Start/Stop (Repeat)	
6	Last Command Priority	Same as position 5	Stop at ON (remote control acceptance) Start at OFF (remote control rejection)
7	Remote Control Rejection	Start at ON	Stop at ON
8	Last Command Priority	Start at ON (remote control acceptance)	Stop at ON (remote control rejection)
9	Remote Control Acceptance OFF	Same as position 7 (only stop is accepted by the remote control)	Same as position 7
A	Remote Control Acceptance/Rejection, OFF	Start at ON (remote control acceptance)	Stop at ON (remote control rejection)
B	Last Command Priority	Same as position 7 (remote control acceptance)	Same as position 7
C	Position 5 + Energy Saving control	Same as position 5	Forced switching off thermostat at ON
D	Position 5 + Temperature Set Back		Setting temperature shift command at ON
E	Position 6 + Energy Saving control	Same as position 6	Forced switching off thermostat at ON
F	Position 6 + Temperature Set Back		Setting temperature shift command at ON

N.B.: When input B2Bc is continuously powered with RS1 in position 7, the system is forcibly switched off (B1Bc input ignored)

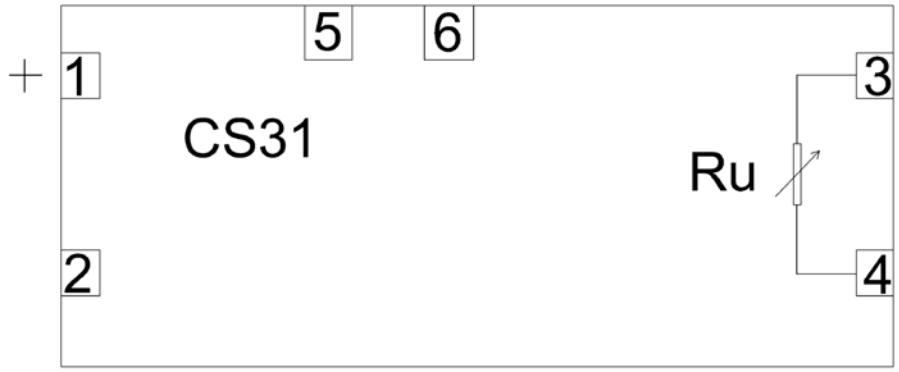
11. Optional extras

Setting the CS31 Analogue Temperature Converter

This optional board enables the ATU temperature to be controlled using an analogue input 0-10 VDC adjustment as in the following table

Set Temp	16	17	18	19	20	21	22	23	24
Volt	0.85	1.71	2.52	3.33	4.02	4.71	5.32	5.92	6.49
Set Temp	25	26	27	28	29	30	31	32	
Volt	7.00	7.49	7.94	8.34	8.76	9.18	9.54	10	

Electrical connection



5-6 : Board power supply 24 VAC (Max 5VA)
1-2 : Analogue Input 0-10 VDC
3-4 : Ohm Analogue Output (must be connected to terminal block A+ A in board EC9432 (D))

N.B.:

The green LED signals that the board is powered

Soft Starter

This optional device enables the fan speed to be increased gradually so as to avoid sharp rises in air pressure in the channelling. Its operation enables the motor torque to be reduced on start up and allows it to be increased gradually to the required value.

12. Frequently asked questions

- What applications is it used in?

A direct expansion ATU is used in those applications where air conditioning of large volumes is required, such as warehouses, sports centres and shopping centres

-What are the advantages of an ATU?

This type of indoor unit supplies high performance in a simple way: it eliminates the need to create plants for distributing water, it allows a considerable reduction in installation costs, and the use of direct expansion guarantees high performance and low consumption.

- What are the disadvantages of an ATU?

A direct expansion ATU is not recommended where a very precise control of the relative humidity level is required. In this case, it is preferable to use a water ATU powered by YOSHI AWS hydronic module.

The data and information contained in this manual are valid for direct expansion installations and may be subject to modifications without the manufacturer being obliged to give prior notice of these.

13. Applications

San Giovanni In Persiceto (BO) Italy
This system comprises 8 25 HP GHPs, each connected to an ATU.

Advantages for the customer:

-- Very low installation cost
-- Extremely reduced technical installation spaces
-- Absence of down times in the supply of hot/cold air
- Operating costs are lower than an equivalent traditional water system (the GUE is higher, there are no pumps that absorb electricity)

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